

Heisenberg operator solutions for Calogero systems

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Heisenberg operator solutions are the most fundamental conceptual object in quantum field theory and multi-body quantum mechanical systems. For Calogero systems based on any root system, which are exactly solvable multi-particle systems with the harmonic confining force plus $1/(\text{distance})^2$ potential, we present the complete set of exact Heisenberg operator solutions $\{e^{i\gamma_k t} \eta_k e^{-i\gamma_k t}\}$ for r -independent ‘sinusoidal’ coordinates $\{\eta_k\}$. Here r is the degree of freedom and the rank of the chosen root system. The Heisenberg operator solutions provide the unified definition of the annihilation-creation operators for various quanta, as in the one-degree cases reported earlier [1].

References

- [1] S. Odake and R. Sasaki, “Exact solution in the Heisenberg picture and annihilation-creation operators”, Phys. Lett. **B641** 112–117, [arXiv:quant-ph/0605221](#), YITP-06-24; “Unified Theory of Annihilation-Creation Operators for Solvable (‘Discrete’) Quantum Mechanics.” J. Math. Phys. **47** 102102, [arXiv:quant-ph/0605215](#), YITP-06-23.